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**Faculdade de Psicologia e de Ciências da Educação**

**THE SHAPE OF US:  
STABILITY AND CHANGE IN ROMANTIC ATTACHMENT  
AND THE EXPERIENCE OF LIFE EVENTS**

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## **Resumo**

A literatura empírica sobre a estabilidade e a mudança da vinculação vai ao encontro dos escritos de Bowlby, demonstrando que as dimensões de vinculação e os modelos internos dinâmicos tendem a manter-se estáveis ao longo do tempo. Contudo, os estudos são inconsistentes no que concerne ao impacto de eventos de vida na flutuação destas dimensões. O nosso trabalho pretende examinar a estabilidade e a mudança na vinculação romântica numa amostra diádica, bem como compreender de que forma diversos acontecimentos de vida influenciam possíveis flutuações em dimensões de vinculação. Para tal, oitenta casais portugueses, com filhos em idade pré-escolar, completaram uma medida de autorrelato de vinculação e um questionário acerca de acontecimentos de vida, três vezes durante um período de dezanove meses, no âmbito do Projeto (RE)CONCILIAR: Impacto da Conciliação Trabalho-Família na Parentalidade e no Desenvolvimento das Crianças (PTDC/MHCCED/5218/2012). As propriedades psicométricas do questionário de vinculação foram avaliadas através de análises fatoriais confirmatórias, o que conduziu a uma estrutura fatorial alternativa deste instrumento em três dimensões: ansiedade, evitamento e segurança. A invariância relacional da medida foi também avaliada, verificando-se a existência de invariância parcial em todos os momentos. A estabilidade e a mudança nas dimensões de vinculação foram examinadas através de análises de variância para medidas repetidas e de regressão linear, múltipla e hierárquica. A ansiedade nas mulheres mudou significativamente ao longo do tempo, ao contrário das restantes dimensões avaliadas. Detetou-se ainda um efeito de correção ao nível da díade, na dimensão ansiedade: os níveis de ansiedade de um elemento do casal contribuíram para o aumento da ansiedade do parceiro. Contudo, os eventos de vida não parecem influenciar as flutuações de vinculação do modo esperado. Este estudo contribuiu para uma melhor compreensão das trajetórias de vinculação e correção em díades portuguesas, e sublinhou a necessidade de investigações futuras acerca do papel desempenhado pelos acontecimentos de vida.

**Palavras-chave:** vinculação, análise diádica, longitudinal, estabilidade, mudança, acontecimentos de vida

## Abstract

Several studies have focused on attachment's stability and change within dyad. Most research supports Bowlby's theory about the stability of internal working models and attachment. However, studies are inconsistent regarding the impact of life events on attachment fluctuations. Our work aims to examine romantic attachment stability and change dyadically, as well as to improve the understanding of how several life occurrences influence attachment fluctuations. Eighty portuguese dual-earner couples with pre-school children answered a self-report measure on attachment and a questionnaire on life events at three time points, during nineteen months, as part of the (IM)BALANCE Project: Impact of Work-Family Conciliation on Parenting and Children's Development, funded by the Foundation for Science and Technology (PTDC/MHC-19CED/5218/2012). The attachment measure's psychometric properties were verified through confirmatory factor analyses. Changes were made to the factorial structure of the questionnaire, which was transformed into three dimensions: anxiety, avoidance, and security. Relational measurement invariance was also tested, and evidence supporting partial invariance was found for all moments of assessment. Repeated measures analysis of variance, and linear, multiple, and hierarchical regression analyses showed that only women's anxiety significantly changed through time. There was also a coregulation effect within-dyad regarding anxiety: one's higher anxiety levels seemed to increase their partner's anxiety levels. Life events did not contribute as expected to attachment fluctuations. This study contributed to a better understanding of attachment trajectories and coregulation in Portuguese dyads, alerting us for the need to further study life events' impact on those trajectories.

**Key words:** attachment, dyadic study, longitudinal, stability, change, life events

## Résumé

La littérature empirique sur la stabilité et le changement de l'attachement vont au devant les écrits de Bowlby, démontrant que les dimensions de l'attachement et les modèles internes dynamiques ont tendance à rester stables dans le temps. Cependant, les études sont incohérents en ce qui concerne l'impact des événements de la vie sur la fluctuation de ces dimensions. Notre travail prétend examiner la stabilité et le changement de l'attachement romantique dans un échantillon dyadique, ainsi que de comprendre comment divers événements de la vie influent sur les fluctuations possibles des dimensions de l'attachement. À cette fin, quatre-vingt couples portugais, avec enfants d'âge préscolaire, ont complété une mesure d'auto-évaluation de l'attachement et un questionnaire sur les événements de la vie, trois fois sur un période de dix-neuf mois dans le contour du Projet (RE)CONCILIER: L'impact de la réconciliation travail-famille en matière de parenté et développement des enfants (PTDC/MHCCED/5218/2012). Les propriétés psychométriques du questionnaire de l'attachement ont été évalués par des analyses factuelles confirmatoires, ce qui a conduit à la structure des facteurs alternatifs de cet instrument dans trois dimensions: l'anxiété, l'évitement et la sécurité. L'invariance relationnelle de la mesure a également été évaluée, et il y a eu une invariance partielle à tous les moments de l'étude. La stabilité et le changement dans les dimensions de l'attachement ont été examinés par analyse de variance pour des mesures répétées et une régression linéaire, multiple et hiérarchique. L'anxiété chez les femmes a considérablement changé au fil du temps, contrairement aux autres dimensions évaluées. Il y avait également un effet de co-régulation du niveau de la dyade dans la dimension de l'anxiété: les niveaux d'anxiété d'un élément partenaire ont contribué à une anxiété accrue chez le partenaire. Cependant, les événements de la vie ne semblent pas influencer les fluctuations de l'attachement de la manière attendue. Cette étude a contribué à une meilleure compréhension des trajectoires de l'attachement et co-régulation dans les dyades portugaises, ainsi qu'à la nécessité d'enquêtes futures sur le rôle joué par les événements de la vie.

**Mots clés:** attachement, étude dyadique, longitudinale, stabilité, changement, événements de la vie

## Contents

Introduction .....	1
I. What we know so far: Literature review .....	2
1. Attachment theory: Origins .....	2
2. Attachment relationships and behaviours: From infancy to adulthood .....	3
3. The role of attachment in romantic relationships: Theoretical and empirical considerations .....	7
4. Attachment's stability and change .....	10
II. Empirical study .....	16
1. Objectives .....	16
2. Hypotheses .....	16
3. Method .....	17
III. Results .....	23
1. Preliminary analyses .....	23
2. Dyadic confirmatory factor analyses .....	24
3. Measurement invariance .....	25
4. Reliability .....	25
5. Analysis of attachment stability and change .....	26
IV. Discussion .....	31
1. Assessing the ECR-SF psychometric properties .....	31
2. Attachment stability and change .....	32
3. Strengths and limitations .....	35
4. Suggestions for future research .....	36
Conclusion .....	38
References .....	39



## Tables

Table 1. ....	25
<i>Dyadic Confirmatory Factor Analysis: Three-factor solution</i>	
Table 2. ....	26
<i>Reliability analysis: Hierarchical Omega coefficient (<math>\omega_h</math>)</i>	
Table 3. ....	27
<i>Anxiety, avoidance, and security: Means and standard deviations</i>	
Table 4. ....	27
<i>Dimension differences within-dyad, across time waves</i>	
Table 5. ....	28
<i>Repeated measures ANOVA: Anxiety and security</i>	

## Appendixes

Appendix A. ....	i
<i>Life-events: Descriptive statistics.</i>	
Appendix B. ....	iii
<i>Confirmatory factor analysis.</i>	
Appendix C.....	v
<i>Measurement invariance.</i>	
Appendix D. ....	viii
<i>Reliability analysis.</i>	
Appendix E.....	ix
<i>Correlations.</i>	
Appendix F.....	x
<i>Repeated measures ANOVA.</i>	
Appendix G. ....	xi
<i>Regressions.</i>	

## Glossary of symbols

### Greek alphabet

$\Delta$ : difference between two values

$\alpha$ : alpha coefficient

$\beta$ : standardized beta coefficient

$\eta_p^2$ : partial eta squared

$\chi^2$ : chi-squared

$\omega_h$ : McDonald's omega hierarchical coefficient

### English alphabet

$d$ : Cohen's  $d$

$df$ : degrees of freedom

$F$ : F-statistic

$M$ : mean

$N$ : sample size

$p$ : probability value

$SD$ : standard deviation

$r^2$ : correlation r-squared

$R^2$ : regression r-squared

$t$ : t-statistic

## **Glossary of abbreviations**

ANOVA: Analysis of variance

CFA: Confirmatory factor analysis

CFI: Comparative fit index

ECR: Experiences in Close Relationships

ECR-RS: Experiences in Close Relationships – Relationship Structures

ECR-SF: Experiences in Close Relationships – Short Form

FIML: Full Information Maximum Likelihood

Ku: Kurtosis

MCAR: Missing completely at random

RMSEA: Root mean square error of approximation

Sk: Skewness

VIF: Variance inflation error

## **Introduction**

We are social creatures; as such, we struggle to forge intimate bonds with other humans. It is amid these connections that we keep evolving, discovering ourselves while we explore another person's world of meanings (Mahoney, 2003). As children, these connections to our parents or main caretakers pave the way for our personality's development, shaping our own perception of ourselves and the world around us. As we grow to become young adults, we establish emotional and intimate connections with our peers: we turn to them for guidance, while offering our own. Romantic relationships are formed under this premise.

The making and breaking of romantic bonds have inspired poets, songwriters, and researchers. Given its strong influence on our everyday lives, it is of interest to dedicate our time to examining these bonds, their underlying dynamics, and their interplay with individual and family variables throughout time.

In our study, we examine trajectories of romantic relationships under the premises of attachment theory. We conceptualize these intimate bonds as mutual careseeking and caregiving relationships, from which to explore the world, and look for safety and comfort (Bowlby, 1982). We seek to understand how these relationships evolve throughout time in terms of attachment dimensions, the mutual attachment influence between partners, and how the experience of life-changing events influences such trajectories.

The first chapter of our work presents a literature review. This includes an overview of attachment theory's origins, considerations about how attachment relationships transform from infancy to adulthood, the role of attachment in romantic relationships, and its stability and change in adulthood. Then, we present our empirical study in the second chapter, describing its objectives, hypotheses, and the methodological design. The obtained results are described in the third chapter. Finally, on the fourth chapter, we discuss these results under theoretical and empirical considerations introduced in our literature review. We also describe the strengths and limitations of the study, and make suggestions for future research. With this dissertation, we expect to shed some light upon attachment dynamics in romantic adult relationships, contributing to a more comprehensive perspective, and drawing implications to psychological interventions in clinical settings.

## **I. What we know so far: Literature review**

### **1. Attachment theory: Origins**

As humans, we search to establish and maintain intimate and emotional bonds with other individuals to assure comfort, support, and protection (Bowlby, 1988). This is the premise for John Bowlby's ground-breaking attachment theory, which emerged in the nineteen-fifties and has been developing ever since.

Based on his work with institutionalized adolescents, Bowlby concluded that separation from parental figures or inadequate parental care could have adverse consequences on the child's development (Bowlby, 1988). Following Lorenz's works in ethology, he proposed that this need for care and proximity was not associated with feeding or sexual needs, a very different point of view from the one assumed by his fellow psychoanalysts at the time (Mikulincer & Shaver, 2007). Moreover, proximity to caregiving figures would serve a need for protection, which was likely to correspond to the prehistorical need to seek refuge from potential predators (Bowlby, 1982; Colin, 1996). Bowlby conceptualized these careseeking and caregiving relationships as attachment bonds, and the proximity-seeking actions as attachment behaviours (Bowlby, 1988). He viewed these bonds and behaviours as normative and adaptive, since it allowed children to preserve their integrity and assure safety thanks to their proximity with older and wiser individuals, called attachment figures (Bowlby, 1982). The pursuit and maintenance of proximity to a caregiver would characterize a distinct behavioural system – the attachment behavioural system – whose biological goal is to obtain protection through proximity with an attachment figure (Colin, 1996). The presence of frightening stimuli activates the attachment system and elicits the proximity search behaviours; these develop early in life, and persist throughout adolescence and adulthood, although taking different forms (Bowlby, 1988).

Mary Ainsworth was another preeminent figure in attachment theory's history. From observations of children in Uganda, in the nineteen-fifties, she drew very similar conclusions to Bowlby's (Ainsworth & Bowlby, 1989). When distressed by a potential threat or by separation from their mothers, these children displayed emotional responses (called *protest* responses), and oriented their behaviour towards obtaining and/or maintaining proximity with these figures. This allowed Ainsworth to hypothesize the existence of a goal-corrected attachment behaviour system, where attachment figures, by being available, sensitive, and

responsive to the child, reduced his or her distress. The child would then obtain felt security: the attachment system's activation would be reduced through caregiving, and he or she could turn their attention to other activities. Attachment figures would not only be caregivers, assuaging the child when needed, but would also be the boosters of his or her environment's exploration (Mikulincer & Shaver, 2007). The consistent availability and sensitivity from attachment figures allow children to explore their surroundings, confident they can return if needed. This is the concept of a *secure base* (Bowlby, 1988).

Ainsworth was also a pioneer in observational studies regarding attachment relationships. The *Strange Situation* involved the analysis of children's behaviour when separated from their mothers, in a controlled environment. From her observations, Ainsworth proposed the existence of three different patterns of attachment (Ainsworth, Blehar, Waters & Wall, 1978): *secure*, *anxious-avoidant insecure*, and *anxious-ambivalent insecure*. Secure children would play while their mother was in the room and show visible distress when separated, but would seem happy upon their mothers' return. Anxious-avoidant insecure children would not explore much of their surroundings, showing little distress when separated from their mothers, and ignoring them upon their return. Anxious-ambivalent insecure children would appear clingy and distressed even before separation, displaying conflicted responses (clinging and resisting comfort) upon their mothers' return. Later, Main and Solomon (1986, cit. in Duschinsky, 2015) identified a *disorganized/disoriented* pattern, characterized by the presence of both anxious and avoidant behaviours, and by strange and tense movements upon stress. These classifications reflect the different manifestations of attachment relationships and behaviours. However, these manifestations change along the individual's development.

## **2. Attachment relationships and behaviours: From infancy to adulthood**

Attachment relationships develop throughout the life span, allowing individuals to maintain emotional stability and to effectively manage distress-inducing events (Shaver & Mikulincer, 2014). However, the behavioural manifestations of the attachment system are mutable throughout time.

During infancy and childhood, individuals are exclusively careseekers. They display emotional cues when distressed or separated from attachment figures (e.g., crying, clinging) to obtain and/or maintain proximity to these figures (Hazan & Shaver, 1994; Bowlby, 1988).

Adolescence, on the other hand, marks the transition from exclusive careseeking to simultaneous careseeking and caregiving (Allen & Land, 1999). Adolescents gradually direct attachment behaviours towards their peers (i.e., friends and romantic partners), groups, and institutions (e.g., school), and the capacity for intimacy emerges (Allen & Land, 1999; Bowlby, 1988). However, attachment to their parents or caregivers does not fade away, as these figures continue to function as a secure base (Bowlby, 1982; Colin, 1996).

In adulthood, the romantic partner is usually the main attachment figure (Shaver & Mikulincer, 2014). The function and dynamics of the attachment system are maintained since one's infancy, but attachment relationships and behaviours towards attachment figures are necessarily different (Hazan & Shaver, 1994). Contrary to what happens during childhood, adult relationships are characterized by reciprocity (individuals are simultaneously careseekers and caregivers) and sexuality (Hazan, Campa, & Gur-Yaish, 2006; Shaver & Hazan, 1988). In childhood, physical contact is a requisite for obtaining felt security, since attachment figures' mental representations repertoire is still limited. An adult, when facing a perceived threat, can access soothing mental representations of interactions with attachment figures, allowing him or her to engage in other activities, such as work (Mikulincer, 2006; Mikulincer & Shaver, 2007).

Regarding adult attachment patterns or categories, Hazan and Shaver (1987) proposed the existence of three different attachment styles, corresponding to the ones studied by Ainsworth et al. (1978): *secure* (marked by comfort regarding intimacy and interdependence), *anxious-ambivalent* (characterized by a concern for rejection and a great need for proximity), and *avoidant* (characterized by fear of intimacy). These different attachment styles appear to be intimately related to different internal working models (Mikulincer & Shaver, 2007). These models can be considered sets of mental representations of the self, the others, and the world; they emerge from the history of early interactions with attachment figures, and are progressively internalized throughout childhood (Bowlby, 1973). The internal model of the self is characterized by the extent to which an individual believes he or she is worthy to be accepted, and deserving of love and support. The internal model of the other is marked by the degree to which others and the world are perceived as trustworthy and dependable (Bowlby, 1973). These internal working models shape the way the attachment system manifests, including interactions with attachment figures, beliefs, and the recollection of early attachment experiences (Ainsworth et al., 1978; Bowlby, 1973; Collins & Read, 1994).



Years later, Kim Bartholomew (1990) proposed a bidimensional model based on the positivity or negativity of internal working models. According to this conceptualization, there are four different attachment prototypes or categories: *secure* (marked by positive self and others working models), *preoccupied* (characterized by a negative model of the self but a positive model of others), *dismissing* (characterized by a positive model of the self but a negative model of others), and *fearfully avoidant* (marked by negative self and others working models). Secure individuals would generally experience satisfactory intimate relationships. Preoccupied individuals would deem themselves unworthy of love, worrying about being abandoned; on the contrary, dismissing individuals would see others as rejecting and untrustworthy, thus distancing themselves from intimacy and valuing independence. The fearfully avoidant prototype would present characteristics of both preoccupied and dismissing categories: even though these individuals would have a strong desire for proximity, this would be undermined by their perception of imminent rejection (Bartholomew, 1990; Bartholomew & Horowitz, 1991).

Different methods were proposed to assess these styles or categories. Hazan and Shaver (1987) created a self-report multiple choice questionnaire where they presented three short sentences describing each one of the attachment categories: security, anxiety, and avoidance. Participants were asked to choose which sentence best described them as partners in a romantic relationship. Levy and Davis (1988) transformed this questionnaire, asking participants to rate on a Likert scale the extent to which they identified with each sentence. Simpson (1990) decomposed those three sentences into several items and created the Adult Attachment Questionnaire, where participants were asked to rate how each item related to them on a Likert scale. Collins and Read (1990) also decomposed Hazan and Shaver's (1987) questionnaire into the Adult Attachment Scale. They identified three different scales underlying this measure: discomfort with closeness, discomfort with depending on others, and concern about being abandoned or unloved.

Bartholomew and Horowitz (1991) created the Relationship Questionnaire to evaluate the four attachment prototypes: secure, preoccupied, dismissing, and fearfully avoidant. Similar to Hazan and Shaver's measure (1987), participants were asked to choose which classification characterized them best. Moreover, Feeney, Noller, and Hanrahan (1994) created the Attachment Style Questionnaire. This self-report measure contemplated 40 items, and participants were asked to rate the extent to which the items best described them in close (not only romantic) relationships.

Using a different approach, Main, Kaplan, and Cassidy (1985) developed the Adult Attachment Interview. Participants were asked questions concerning the relationships with their parents, including relational experiences and their underlying meaning. The interviews are to be recorded and coded, allowing researchers to categorize each individual regarding their attachment style (Mikulincer & Shaver, 2007). Similarly, the Current Relationship Interview (CRI; Crowell & Owens, 1996) assessed one's attachment style regarding their romantic partner.

Brennan, Clark, and Shaver (1998) performed factor analyses on all items from existing self-report measures, and concluded that there would be two factors underlying those items: *anxiety over abandonment* and *avoidance of intimacy* (Bartholomew & Horowitz, 1991; Mikulincer & Shaver, 2007). Anxiety involves concerns about an attachment figure's availability and responsiveness, as well as fear of rejection and abandonment. Avoidance is defined as the degree to which individuals limit their proximity, intimacy, and interdependence with others, while distrusting attachment figures. Individuals high in anxiety tend to use hyperactivation strategies (e.g., emotion exacerbation, constant demands for attention and support), developed from attachment relationships with inconsistent figures (i.e., sometimes they were available, other times they were not). On the contrary, individuals high in avoidance tend to keep an emotional distance from attachment figures, deactivating their attachment system – strategies developed in early attachment relationships, where they were punished for displaying distress or needs (Shaver & Mikulincer, 2014). Considering the bidimensional model Bartholomew proposed, secure individuals present low levels of both anxiety and avoidance. Preoccupied individuals display high levels of anxiety and low levels of avoidance, as opposed to dismissing individuals. Fearfully avoidant individuals present high levels of both anxiety and avoidance (Mikulincer & Shaver, 2007).

Brennan et al. (1998) proposed measuring anxiety and avoidance with two different scales, thus creating the Experiences in Close Relationships (ECR) questionnaire. This measure has been revised through time and new forms were developed, including the ECR – Relationship Structures (ECR-RS, which assesses attachment dimensions in various close relationships; Fraley, Heffernan, Vicary, & Brumbaugh, 2011), and the ECR-Short Form (ECR-SF, a 12-item version of the ECR; Wei, Russel, Mallinckrodt, & Vogel, 2007). Several studies have tested these measures' two-factor structure and its invariance across samples. Most found evidence supporting the instruments' structure (e.g., Alassandri et al., 2014; Mastrotheodoros, Chen, & Moti-Stefanidi, 2015). However, Ávila, Brandão, Teixeira,

Coimbra, and Matos (2015) did not replicate these findings, suggesting a three-factor structure instead.

Regarding how men and women differ in attachment, the first studies on adult attachment (e.g., Hazan & Shaver, 1987) found no gender differences regarding attachment styles (Kirkpatrick & Davis, 1994). However, most recent studies concluded otherwise. Schmitt (2013), in a study with over 17 thousand participants from 62 cultural regions, found that men were significantly more avoidant than women in all cultures, although with small to moderate effects. Adopting a dimensional perspective, Del Giudice (2013), also found higher avoidance levels and lower anxiety levels in men than in women, when examining more than 66 thousand participants from different regions. However, effect sizes depended on sample (higher in community samples than in college and web-based samples) and culture (European and Middle-Eastern participants displayed more pronounced differences). Moreira, Martins, Gouveia, and Canavarro (2015), in their validation of the ECR-RS in a Portuguese sample, showed that men were more avoidant than women only when considering attachment to friends. These differences might be explained by traditional gender roles: men are expected to feel more discomfort in self-disclosure and intimacy, and to communicate less as the relationship progresses (Lindsey, 2015). This might prone men to display higher levels of avoidance in their personal relationships.

### **3. The role of attachment in romantic relationships: Theoretical and empirical considerations**

As mentioned earlier, attachment figures in adulthood are, in general, romantic partners. Individuals experiencing intimate relationships not only ask and receive care, but also provide it for their partners.

In late nineteen eighties, Hazan and Shaver (1987) expanded John Bowlby's work by conceptualizing love and romantic relationships using attachment theory. According to these authors, love involves the combination of three different behavioural systems: *sexual*, *caregiving*, and *attachment* systems (Hazan, Gur-Yaish, & Campa, 2004). Because the attachment system develops early in life, it would exert great influence on how caregiving and sexual systems manifest (Hazan & Shaver, 1994). Using this conceptualization, love is viewed as a dynamic phenomenon, including the strengths and needs of both partners in terms of sexuality, caregiving, and attachment (Mikulincer, 2006). For a romantic

attachment relationship to emerge, proximity seeking is needed; sexual attraction/desire stands out as the its major catalyst (Costa, 2005). After this initial attraction stage, it's expected that both partners care for one another, functioning as a mutual secure base. All interactions resulting in felt security will inforce the belief that the partner is available and responsive (Hazan & Shaver, 1994).

This process is highly influenced by each partner's internal working models, attachment behaviours, and consequently attachment orientations (Mikulincer, 2006). All these aspects will influence how individuals enter, maintain, and function in that relationship (Pietromonaco & Beck, 2015). A more secure attachment style (i.e., low levels of anxiety and avoidance) is associated with higher marital satisfaction (Timm & Keiley, 2011; Treboux, Crowell, & Waters, 2004) and with higher levels of interdependence, commitment, and trust (Simpson, 1990). On the contrary, insecure attachment styles are linked with less stable relationships (Overall & Simpson, 2015), with a decrease in marital satisfaction through time (Sadikaj, Moskowitz, & Zuroff, 2015), more frequent experience of negative emotions (Simpson, 1990), and with higher levels of relationship conflict and proximity avoidance (Treboux, Crowell & Waters, 2004). However, anxiety and avoidance influence relationships differently: while anxiety is positively associated with general relationship conflict, avoidance is negatively associated with marital satisfaction and support (Li & Chan, 2012).

Variability in attachment orientations can influence differences in the sexual behaviour system. Individuals with high anxiety levels have more tendency than others to engage in sexual intercourse to reduce insecurity and enhance intimacy. On the other hand, high levels of avoidance are associated with the experience of casual sexual relationships, and with engagement in sexual activities as a result of peer pressure (Schachner & Shaver, 2004). On the contrary, secure individuals seem more comfortable with their own sexuality than their insecure counterparts (Cooper et al., 2004).

Concerning the influence of attachment on caregiving, higher levels of anxiety are positively associated with a compulsive caregiving to a romantic partner (Julal & Carnelle, 2012). This can be explained by these individuals' difficulty in being sensitive to their partners' needs; they provide care as a way to respond to their own attachment needs (Collins, Ford, Guichard, Kane, & Feeney, 2010). Self-disclosure is also influenced by romantic attachment: secure and anxious individuals show more self-disclosure than their avoidant counterparts; however, secure individuals show the highest reciprocity and flexibility in this process (Mikulincer & Nachshon, 1991). Moreover, anxiety levels are

positively correlated with a relationship-focused self-disclosure (Tan, Overall, & Taylor, 2012).

The attachment system also deeply influences dyadic processes. For instance, when concerning affect regulation, individuals low in anxiety are less likely to experience spouse's positive affect regulation when their partner is also low in anxiety (Butner, Diamond, & Hicks, 2007). More avoidant individuals with negative perceptions about their partners' emotions become more hostile during conflicts (Overall, Fletcher, Simpson, & Fillo, 2015).

Furthermore, dyadic regulation processes are called to action to mediate attachment system's manifestations within the couple. Overall and Lemay (2015) explain that when the attachment system activates, felt-security is obtained through proximity or distance to the partner; this involves manipulating the partner's emotions, thoughts, and behaviours, into coming close or keeping his or her distance. Anxiety individuals would manifest their need for closeness using guilt inducing strategies and influencing their partners into providing them the proximity and support needed. Avoidant individuals would disengage and withdraw, thus distancing themselves from their partners. However, according to Overall and Simpson (2015), partners of more insecure individuals also act to regulate their thoughts, behaviours, and emotions, by meeting their attachment needs. Towards more anxious partners, individuals would reassure them of their positive feelings, exaggerate their affection, and provide them with enhanced proximity and intimacy. When facing more avoidant partners, one would provide them with instrumental support (e.g., tangible advice) to respond to their autonomy needs, and respond with positivity to affirm their negative expectations of others' support. These authors propose that such regulations of partners' attachment-related emotions and behaviours would foster a secure environment within the relationship, thus contributing to an enhance in attachment security.

To sum up, attachment dimensions clearly exercise influence on how romantic relationships are created, maintained, and experienced. Its effects are perceived in relational dimensions, in the experience of sexuality and caregiving, and in dyadic regulatory processes. However, as these relational processes are dynamic, internal working models and attachment dimensions can also suffer some fluctuations during an ongoing relationship.

#### 4. Attachment's stability and change

According to John Bowlby, being attached is “a persistent attribute, which changes only slowly over time and which is unaffected by the situation of the moment” (Bowlby, 1988, p. 28). Some factors can explain this stability. Internal working models, which are reasonably stable throughout childhood, develop within attachment relationships and influence the interactions with those attachment figures, leading the individual to foster scenarios where their models are confirmed (Feeney & Noller, 1996). These are then reinforced, and are less likely to change (Fraley & Brumbaugh, 2004). Individuals tend to develop relationships with partners who display similar attachment orientations. Furthermore, in all relationships, partners are subjected to forces of mutual influence, such that they tend to converge in their attachment behaviours (Gillath, Karantzas, & Fraley, 2016).

However, if internal working models are built around relationships, they are challenged and revised when faced with interpersonal experiences. Changes in interactions with attachment figures (e.g., they become inconsistent or non-responsive) and the experience of life-changing events can defy an individual's view of self and others, and consequently produce change in one's attachment dimensions (Feeney & Noller, 1996; Gillath, Karantzas, & Fraley, 2016).

During childhood, the attachment system tends to transform when the main caregivers are suffering distress, and thus are less available and responsive to children's needs (Mikulincer & Shaver, 2007). When considering changes from childhood to adulthood, literature shows that most individuals maintain their attachment category; however, the experience of distressing life events (e.g., parental divorce) predicts some change in the attachment system, with people previously categorized as *secure* becoming *insecure* (Hamilton, 2000; Lewis, Feiring, & Rosenthal, 2000; Pascuzzo, Cyr, & Moss 2013, Sagi, IJzendoorn, Aviezer, Donnell, & Mayseless, 1994; Waters, Merrick, Treboux, Crowell, & Albersheim, 2000).

In adult attachment, stability and change have been studied using a variety of time intervals (from one week to seventeen years), using individual and dyadic cross-sectional and longitudinal designs. According to these works, attachment orientations or categories are generally consistent throughout time; nevertheless, there is still some room for change. Studies assessing attachment categories found that 66 to 80% of individuals maintain their attachment classification through time (Bakermans-Kranenburg & van IJzendoorn, 1993;

Baldwin & Fehr, 1995; Benoit & Parker, 1994; Crowell, Treboux, & Waters, 2002; Fuller & Fincham, 1995; Keelan, Dion & Dion, 1994; Mikulincer & Shaver, 2007; Zhang & Labouvie-Vief, 2004).

Regarding attachment dimensions or orientations, test re-test correlations varied from .37 to .68 for security, .56 to .73 for avoidance, and .43 to .72 for anxiety (Collins & Read, 1990; Hammond & Fletcher, 1991; Feeney & Noller, 1992). However, this stability tends to decrease when the time intervals between assessments increase (David, Burge, & Hammen, 1997). Individuals classified as secure were the most stable (Kirkpatrick & Hazan, 1994), while anxious or ambivalent individuals changed the most throughout time (Baldwin & Fehr, 1995). Moreover, according to Fraley, Vicary, Brumbaugh, and Roisman (2011), attachment to parents seemed to be more stable than attachment to romantic partners.

Which factors can account for this change?

Experiencing psychotherapy can lead to changes in attachment dimensions, fostering security levels and decreasing anxiety (Gillath, Karantzas, & Fraley, 2016). The individual's development can also involve transformations in attachment dimensions: in the light of this assumption, several authors (Chopik, Edelstein, & Fraley, 2013; Hudson, Fraley, Chopik, & Heffernan, 2015) proposed the existence of normative age-related attachment changes. These authors, using participants recruited online, showed that anxiety decreased with age; on the contrary, there were no age significant differences regarding avoidance. In relationships with parents, older people tended to display higher anxiety levels; in relationships with peers and romantic partners, individuals in general presented higher levels of avoidance. The authors hypothesized that as people grow older, they have less concerns about the responsiveness of their attachment figures, and so their anxiety decreases. Higher anxiety facing parental relationships could be associated with increasing doubts about their future availability. Furthermore, higher avoidance in peer and romantic relationships may derive from relational dynamics involving more autonomy. These would represent normative shifts in attachment orientations (Chopik, Edelstein, & Fraley, 2013; Hudson, Fraley, Chopik, & Heffernan, 2015). However, these conclusions arise from cross-sectional studies; as such, they do not allow a full understanding of how attachment develops throughout the life span.

Life events have been hypothesized to be at the core of change in attachment dimensions. These occurrences, such as interpersonal conflict and support, life transitions, relationship dissolution, and war trauma have been studied as variables underlying attachment fluctuations, in longitudinal works (Gillath, Karantzas, & Fraley, 2016).

Regarding interpersonal relationships and life transitions, Green, Furrer, and McAllister (2011), in their sample of low-income mothers, found that for women presenting low stress, an increase in their social support led to a decrease in their attachment anxiety. Moreover, decreases in their avoidance levels were associated with an increase in social support. Davila, Burge, and Hammen (1997) studied the stability of attachment categories in women, two years after their high-school graduation. Sixty-six percent of those participants maintained their attachment style classification. These authors also hypothesized that any attachment change was due to individual differences in one's stable vulnerability factors (e.g., individual and family history of psychopathology, personality disorders) and not a reaction to a life event such as graduation. Fraley et al. (2011), in their study with two samples of college community individuals, also found evidence supporting a prototype model of attachment stability and change throughout thirty days and one year. According to these authors, fluctuations in attachment dimensions would be considered temporary deviations from a stable value.

Cozzarelli, Karafa, Collins, and Tagler (2003) studied the variability of attachment categories and its association with the experience of life events and stable vulnerability factors (i.e., depression and abuse), in a sample of women, during a two-year period. Forty-six percent of the participants changed their attachment category. Women who became insecure were more likely to have experienced certain events, such as relationship dissolution or sexual assault, and to have a history of depression or abuse. Unlike Davila and colleagues (1997), these authors concluded that both the experience of life events and the existence of vulnerability factors contributed to attachment variability through time. Moreover, Davila and Cobb (2003), in their study with undergraduate students, proposed that higher fluctuations of attachment would be better explained by the lack of clarity in internal working models (i.e., lack of a clear sense of self and others). Ruvolo, Fabin, and Ruvolo (2001) found that individuals experiencing a relationship breakup became less secure five months after their first assessment, than those who remained with the same partners.

Concerning war trauma, Mikulincer, Ein-Dor, Solomon, and Shaver (2011) studied the trajectory of attachment dimensions in Israeli military veterans who had been war prisoners. Data was collected at three time points: 18, 30, and 35 years after the war. Throughout the study, there was an increase in anxiety and avoidance levels, suggesting that traumatic events, like war captivity, can have a long term effect in the sense of attachment security.



Dyadic studies are of vital importance, since they take into account that attachment develops within a significant relationship (Simpson & Howland, 2012). Moreover, dyadic research on attachment also considers life transitions experienced by both members of the couple. Studying the transition to marriage in a sample of newlywed dyads, Davila, Karney, and Bradbury (1999) discovered that all couples enhanced their security levels two years after a first assessment, and that attachment fluctuations were due to stable and individual vulnerabilities (e.g., history of psychopathology), and not to this event *per se*. Considering the transition to parenthood, Simpson, Rholes, Campbell, and Wilson (2003) showed that women became more ambivalent 32 weeks after the first assessment if they perceived less support and more anger from their partner. Both members of the couple became more avoidant when men perceived themselves as more supportive, and when women actively searched for their support during this transition. Feeney, Alexander, Noller, and Hohaus (2003) also found evidence supporting less anxiety stability in women than in men, six months after the birth of their first child.

Literature about the influence of life events on attachment stability presents mixed results. This inconsistency may be explained by the lack of consideration of the subjective impact an event has on each individual's life. In fact, all previous cited papers did not assess the meaning participants attributed to life-changing circumstances (Gillath, Karantzas, & Fraley, 2016). Davila and Sargent (2003) addressed this issue by asking a sample of undergraduate students to indicate the occurrence of specific life events, and to rate the extent to which an event led to an interpersonal or academic loss. These students were assessed daily for 52 days; on each assessment, they also completed measures regarding their attachment style. These authors found that classifying life events as interpersonal losses (but not as academic losses) was associated with an increase in avoidance and anxiety levels, regardless of the type and number of events. This paper alerts us for the importance of subjectivity, suggesting that it is the meaning individuals attribute to an occurrence, and not the occurrence itself, that influences his or her attachment style.

None of the previous reported studies assessed dyadic regulation processes between partners' attachment styles. Considering the attachment system's influence on the development and functioning of romantic relationships (e.g., Pietromonaco & Beck, 2015), it would be of interest to analyse the interaction between attachment characteristics within couples. Bearing this in mind, Hudson, Fraley, Brumbaugh, and Vicary (2014) studied attachment's coregulation in couples throughout a year, controlling for the participants' levels of anxiety and avoidance regarding their partner. The authors concluded that changes

in both spouses' attachment orientations co-occur in two different manners. On the one hand, changes in anxiety and avoidance levels of both partners were positively associated through time, suggesting that both partners display similar responses to the same life experiences. On the other hand, attachment orientations had prospective effects on spouse's attachment: one's insecurity predicted his or her partner's avoidance fluctuations, two months after a first assessment. The authors hypothesize that insecurity would prevent the individual to respond adequately to their partners' needs, who would distance themselves and become more avoidant.

Taken together, these studies reflect the state of the art regarding the knowledge about attachment's stability and change. There is a high prevalence of attachment stability, consisting with Bowlby's conceptualization. However, there seems to be room for some change, and this can be explained by certain stable vulnerability factors (e.g., a history of depression), and by the experience of life events, such as interpersonal losses and traumatic circumstances. Furthermore, considering how the attachment system influences several aspects of romantic relationships, it was not strange to find preliminary evidence for attachment coregulation within the dyad.

These studies' findings cannot be compared lightly. While the first studies on this topic considered rank-level stability, concerning the ordering of individuals through time (e.g., Kirkpatrick & Hazan, 1994), most recent research (e.g., Hudson et al., 2015) has been focusing on mean-level stability, i.e., how a mean level of a certain variable changes across time (Gillath, Karantzas, & Fraley, 2016). Rank-order and mean-level stability are conceptually different. Researchers assessing attachment's rank-order stability refer to categories like Hazan and Shaver's or to Bartholomew's bidimensional model, assessing them through multiple choice self-report questionnaires (e.g., Hazan & Shaver's questionnaire) and interviews (e.g., AAI). Other authors focusing on mean-level stability work on a dimensional framework, using questionnaires with Likert scales evaluating anxiety and avoidance (e.g., ECR). These aspects are also statistically independent: it is possible for an individual to vary their mean-levels of a certain dimension, while maintaining their attachment rank category (Gillath, Karantzas, & Fraley, 2016).

Moreover, studies focusing on rank-level stability also use different measures to assess attachment stability and change. As seen in Scharfe and Bartholomew's work (1994), the obtained results vary with the attachment measure. These authors found evidence for attachment style stability of 77% when using assessment interviews, 59% with self-report measures, and 70% with partner report measures, eight months after a first assessment.

Although there is an ongoing debate about whether to adopt a categorical approach (and categorical measures) or a dimensional approach (using continuous variables), Fraley and Waller (1998) stated that measuring attachment categorically would be restrictive and lead to incorrect conclusions. These authors, in a study using taxometric procedures, proposed that attachment would be better examined through a dimensional lens, and more variability would arise from the use of continuous measures. Furthermore, according to Fraley, Waller, and Brennan (2000), ECR questionnaires present better psychometric properties than other measures of attachment focusing on categorical or prototypical attachment approaches. Thus, a dimensional conceptualization of attachment using ECR questionnaires as its measures seems to be more adequate to study attachment stability and change.

Finally, not all these studies examined the factor structure validity of the measures for the sample used; as such, the validity of the results is questionable. There are, however, some exceptions: e.g., Brennan and Shaver (1995) examined the questionnaire structure's fit in their sample, thus improving the validity of their conclusions. No studies mentioned relational invariance; as such, gender comparisons are compromised, since there is no empirical evidence sustaining that attachment dimensions are assessed similarly in men and women. Furthermore, most of the research was conducted in English-speaking countries, with young adults from college communities. These studies also present different samples, in terms of characteristics and dimensions. Such aspects limit the results' generalization to other cultures or cohorts.

## **II. Empirical study**

### **1. Objectives**

The literature about attachment dimensions stability and change within dyads, and the impact of life events on these trajectories, is scarce. Studies focused on undergraduate students, on specific individual or dyadic samples experiencing previously identified life transitions (e.g., transition to parenthood), and were conducted mostly in the North American culture. There are authors who studied adult attachment dimensions with Portuguese participants (e.g., Ávila et al., 2015; Moreira et al., 2015), but none explored the concept of stability and change, nor the subjective impact of life events on attachment dimensions. The present study aims to expand previous findings by analysing longitudinally attachment through a dimensional framework, as well as several life events' impact on such dimensions, in Portuguese dual-earner heterosexual couples, in families with pre-school children. To the best of our knowledge, this is the first study to focus on attachment's stability and change within dyads with children, in the Portuguese culture.

Our goals are (a) to assess anxiety and avoidance levels on each member of the couple throughout nineteen months, in three assessment waves, (b) to compare men and women on these levels, (c) to examine the coregulation of attachment orientations within-dyad throughout time, (d) to study the impact of life events on attachment dimensions' variability, and (e) to analyse whether and how the subjective meaning of those events influence such variability. Moreover, we intend to assure the validity of our results through the assessment of our instrument's validity (i.e., examining the questionnaire's structure fit in men and women), relational invariance (i.e., analysing if the concepts are measured equally in men and women), and reliability (in each time wave, for both men and women).

### **2. Hypotheses**

Since this is the first study to address the topic of attachment's stability and change in the Portuguese culture, we adopted an exploratory approach. However, considering our literature review, there are some results we expect to find:

- More stability than change in individual anxiety and avoidance levels between assessments, i.e., to find few differences in anxiety and avoidance throughout the three time waves, for men and women (H1);
- Significant differences between men and women regarding those dimensions, i.e., higher avoidance and lower anxiety levels for men than for women (H2);
- Within-dyad coregulations of attachment dimensions, i.e., one's anxiety and/or avoidance scores to explain some variability of their partners' anxiety and/or avoidance levels; (H3);
- The subjective impact of life events to explain some variability in anxiety and/or avoidance between time waves (H4).

### **3. Method**

#### **3.1 Participants and procedure**

The initial sample consisted of 360 dual-earner couples with pre-school children (aged three to six years-old), as part of the (IM)BALANCE Project: Impact of Work-Family Conciliation on Parenting and Children's Development, funded by the Foundation for Science and Technology (PTDC/MHC-19CED/5218/2012). These couples provided information about multiple aspects of their relationship and their child at three time points: March 2013, seven months later, and again one year later. Participants were recruited through a convenience sampling method, among 25 public and private preschools in Porto and Gaia – two contiguous urban centres in the North region of Portugal, the most populated area of the country (Statistics Portugal, INE, 2011). After obtaining permission from these institutions, the main goals of the project were explained to the schools' coordinators and kindergarten teachers. These teachers were given flyers describing the study, as well as copies of the research measures for distribution among the children's parents. Couples who agreed to be a part of this project provided their written consent, and received instructions as to complete the questionnaires individually, placing them in separate sealed envelopes and returning them to their children's teacher. The collected surveys were then returned to the researcher. Since our interest was limited to the relationship within the dyad, information about the child was not considered in this study.

Most dyads participated only in the first assessment wave, since their children progressed into primary school before the second assessment took place, and were not recontacted. Some couples, however, took the opportunity to re-join the study in the third wave of assessment.

Our study consisted in two different but complementary parts. The first part focused on the evaluation of the attachment instrument's psychometric properties; the second part focused on the analysis of stability and change of romantic attachment through time and the experience of life events, using refinements obtained in earlier analyses.

In the first part of the study, we retained dyads participating in at least two moments of assessment (to avoid undesirable effects of experimental mortality; Clark-Carter, 2004) and who remained together throughout the assessments (so the participants would consistently report about the same partner), excluding outliers. As such, in this first set of analyses, our sample consisted of 145 couples. At the first assessment, men ranged in age from 26 to 52 years-old ( $M = 36.21$ ,  $SD = 5.15$ ), and their highest education levels were as follows: 4.8% had attended primary school, 18.6% had attended 9th grade, 34.5% completed high school, and 42.1% had a higher education degree (bachelor's/master's/Ph.D.). Nine men (6.2%) reported being married before. Women ranged in age from 23 to 46 years-old ( $M = 34.77$ ,  $SD = 4.30$ ), and their highest education levels were as follows: 1.4% attended primary school, 11.7% attended 9th grade, 26.2% completed high school, and the majority (60.7%) had a higher education degree (bachelor's/master's). Seven women (4.8%) reported being married before. Most of these couples (90.3%) declared being married; 9% reported cohabiting with their partner. They stated being married or cohabiting for an average of eight years ( $M = 100.17$  months,  $SD = 42.99$ ; range 28 – 318 months), and being together, in average, for 13 years ( $M = 155.43$ ,  $SD = 56.57$ ; range 58 – 356 months). Concerning their children, 56.9% of these dyads reported having one child, 38.25% had two children, and 4.45% had three or more children.

For the second part of our study, considering its longitudinal design, we retained from the previous sample dyads who participated in all three waves of assessment. Our final sample consisted of 80 couples. At the first assessment, men ranged in age from 28 to 50 years old ( $M = 35.91$ ,  $SD = 4.51$ ). Regarding their highest education levels, 5.0% attended primary school, 16.3% attended 9th grade, 36.3% completed high school, and the majority (42.5%) had a higher education degree (bachelor's/master's). Six men (7.5%) reported being married before. Women ranged in age from 25 to 46 years old ( $M = 34.98$ ,  $SD = 4.07$ ). Regarding their highest education levels, 2.5% attended primary school, 10% attended 9th

grade, 22.5% completed high school, and the majority (65%) had a higher education degree (bachelor's/master's). Six women (7.5%) reported being married before. Most of these dyads (91.3%) declared being married; 8.7% reported cohabiting with their partner. They stated being married or cohabiting for an average of eight years ( $M = 97.60$  months,  $SD = 45.56$ ; range 28 – 318 months), and being together, in average, for 13 years ( $M = 151.43$ ,  $SD = 60.97$ ; range 58 – 356 months). Concerning their children, 57.5% of these dyads reported having one child, 36.9% had two children, and 5% had three or more children.

### **3.2 Instruments**

For the (IM)BALANCE project, researchers used a variety of measures. In the present study, we will focus only on the assessment of attachment of each member of the couple, as well as on the assessment of life events.

#### ***Socio-demographic characteristics***

Participants answered a sociodemographic questionnaire on gender, age, education levels, relationship and marriage or cohabitation length, and number of children. Other structural variables from work (e.g., how many hours they work per week) and family (e.g., age of their children) were also assessed, but will not be contemplated in this study.

#### ***Attachment dimensions***

The Experiences in Close Relationships Scale – Short Form (ECR-SF; Wei, Russell, Mallinckrodt, & Vogel, 2007; Portuguese version, Oliveira & Costa, 2007) was used to assess attachment dimensions or orientations. This questionnaire consists of 12 items measuring two attachment dimensions with six items each: anxiety (e.g., item 4: “*my desire to be very close sometimes scares people away*”), and avoidance (e.g., item 5: “*I try to avoid getting too close to my partner*”). Participants were asked to rate each item using a seven-point Likert scale, ranging from *strongly disagree* (1) to *strongly agree* (7).

#### ***Life events***

Participants were asked to answer a questionnaire about life events they had previously experienced. This life-events questionnaire was informed by previous work on life events (Norbeck, 1984; Sarason, Johnson, & Siegel, 1978). It lists a total of eight general life events that investigate changes in interpersonal/family (e.g., *childbirth*, *divorce*), health (e.g., *serious health disease*), and work domains (e.g., *change in the professional situation*). Participants were asked to report if they experienced any of the eight events in the last year (*yes* or *no*) and to rate their impact on a six-point Likert-scale, ranging from 1 (*extremely*

*negative*) to 6 (*extremely positive*), or to signal whether the event had no impact (selecting *no impact*). In some cases, participants were asked to specify the type of change experienced (for instance, regarding the life event *change in the professional situation*, add *job loss* or *retirement*). They could also add other events they had experienced, reporting the impact those events had on their lives. Participants completed this questionnaire in the second and third waves of assessment.

### 3.3 Data analysis

First, we screened the data for normality and outliers, as well as for dyads that experienced separation or divorce; these couples were then excluded. According to Field (2009), univariate normality was verified through the ECR-SF items' descriptive statistics, examining the Kolmogorov-Smirnov normality test (if not significant,  $p > .05$ , normality was assumed), and the skewness (Sk) and kurtosis (Ku) values (if  $|Sk| > 3$  and  $|Ku| > 10$ , normality was assumed). To detect univariate outliers in ECR-SF items, we analysed frequency distributions of  $z$  scores ( $|z| > 3.00$  signals an outlier; Field, 2009). Couples with multivariate outliers were detected using the Mahalanobis distance (D) statistic (Kline, 2005). Couples with at least three outliers per time wave and/or multivariate outliers would be excluded to avoid bias. The verification of univariate normality and the deletion of outliers allowed for the verification of multivariate normality (Kline, 2005).

To examine attrition, independent samples  $t$ -tests were performed to compare drop-out dyads and participating couples in terms of demographic and attachment variables. The assumption of homogeneity of variances was assessed through Levene's test (if  $p > .05$ , homogeneity assumed; Field, 2009). Drop-outs after time one were compared with time two participants and then with time three participants. Drop-outs after time two were also compared with time three participants.

The ECR-SF questionnaire's validity was tested next. Through dyadic Confirmatory Factor Analysis (CFA), conducted using SPSS AMOS 24.0.0 software, we verified the questionnaire's latent structure in each time wave (Brown, 2006). To examine the pattern of missing values (a prerequisite for the realization of CFA), we used the Little Test (Tabachnick & Fidell, 2007): first for all ECR-SF items, then for each time wave, and finally separately for each gender. This provides us a chi-square test ( $\chi^2$ ); if non-significant, we can conclude the presence of the pattern Missing Completely at Random (MCAR). The obtained CFA model's fit was assessed using the following indices, according to Marôco (2014):  $\chi^2$  (the lowest, the better),  $\chi^2/df$  (acceptable if  $]2, 5]$ , good if  $< 2$ ), significance value (good if  $p$



< .05), CFI (Comparative Fit Index, acceptable if [.80, .90[, good if > .90), and RMSEA (Root Mean Square Error of Approximation, acceptable if [.05, .10], good if < .05). Modification indices higher than 11 were taken into account for model adjustments (e.g., adding covariances between observable variables' errors, when justified by theoretical meaning) to improve its fit.

To test how the obtained model generalized across gender, relational measurement invariance was performed separately for each time wave, using the same software (Brown, 2006). This procedure consisted in assessing each model's fit, by comparing it to a previous unconstrained model. Through the obtained CFA model, invariance was tested sequentially in different levels: configural, metric, scalar, strict, and factor covariance (van de Schoot, Ligtig, & Hox, 2012). The  $\Delta CFI$  and  $\Delta RMSEA$  were used to test the significance of the difference between models; cut-off points of  $\Delta CFI < .15$  and  $\Delta RMSEA < .10$  were used (Chen, 2007).  $\Delta\chi^2$  was not considered, since it is sensitive to sample size (Cheung & Rensvold, 2002).

Reliability analysis was performed calculating the McDonald's Omega hierarchical coefficient ( $\omega_h$ ), performing a monofactorial CFA on the highest invariance level previously obtained (McDonald, 1978; Stone et al., 2013).  $\omega_h$  was calculated separately for each attachment dimension, gender, and time wave<sup>1</sup>. Unlike  $\alpha$  coefficient,  $\omega_h$  does not require the error variance of each item to be uncorrelated; furthermore,  $\omega_h$  has proven to be more sensitive to a scale's internal consistency (Cho & Kim, 2015; Dunn, Baguley & Brunsten, 2013). Coefficients were considered adequate if  $\omega_h = [.60 - .70[$ , acceptable if  $\omega_h = [.70 - .80[$ , good if  $\omega_h = [.80, .90[$ , and very good if  $\omega_h \geq .90$  (Stone et al., 2013).

To analyse attachment dimensions' variability, we used the SPSS version 24.0.0 software. Paired samples t-tests were performed to assess differences between men and women in all dimensions and time waves. The assumption of homogeneity of variances was assessed through Levene's test. Cohen's  $d$  was calculated as an effect size measure, with a small effect if  $d = [.20 - .50[$ , medium if  $d = [.50 - .80[$ , and large if  $d \geq .80$  (Field, 2009). Repeated-measures analyses of variance (ANOVA) were conducted to test for differences in each dimension between time waves, separately for men and women. The assumption of sphericity was verified through Mauchly's test (if  $p > .05$ , the assumption was met) in each analysis. In case this assumption was violated, Greenhouse-Geisser correction for degrees

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<sup>1</sup>  $\omega_h$  was computed using the following formula:  $(\sum_{j=1}^k \lambda_j)^2 / [(\sum_{j=1}^k \lambda_j)^2 + \sum_{j=1}^k \delta_j^2]$ , where  $\lambda_j$  equals the standardized factor loading of indicator  $j$  of a latent variable, and  $\delta_j$  the standardized unique variance,  $1 - \lambda_j^2$  (McDonald, 1978; Stone et al., 2013).

of freedom was used (Field, 2009). Partial eta-squared ( $\eta_p^2$ ) was the obtained effect size measure, signalling a small effect size if  $\eta_p^2 = [.01 - .06[$ , medium if  $\eta_p^2 = [.06, .14[$ , and large if  $\eta_p^2 \geq .14$  (Cohen, 1988, cit. in Pallant, 2001).

Finally, hierarchical, multiple, and linear regressions were performed to assess how demographic and attachment variables (from self and partner), the occurrence of events, the number of experienced life events, and the subjective impact of those events predicted change in attachment dimensions, between times two and three. First, multiple regressions using enter method were conducted separately to test the power of variable blocks (i.e., demographic, attachment, life events, subjective impact of life events); then, the predictors from each block found significant were used in posterior hierarchical multiple regressions. To perform these analyses, life events measured at times two and three were grouped together into three different categories (Work-related events, Interpersonal/family-related events, and Health-related events); the number of life events was obtained for each dyad, men, and women. Since we were interested in evaluating the dyadic impact of events (i.e., how events experienced by one member of the couple affect their partner, and vice versa), we treated impact variables at a dyadic level, and created two distinct variables (*positive* and *negative*) globally for the couple and for each category of events.

All assumptions were assessed in each regression analysis. Sample size was deemed adequate for all analyses (Pallant, 2001). Independence of errors was verified through the Durbin-Watson test (if  $[1,3]$ , this assumption was met); the assumption of no multicollinearity was assessed through the examination of correlation values ( $r$ ) and VIF (Variance Inflation Factor) and Tolerance values (if  $r < .90$ ,  $VIF < 10$ , and  $Tolerance < .20$ , there was no multicollinearity). Linearity, homocedasticity, and normal distribution of errors were examined graphically (Field, 2009).

### III. Results

#### 1. Preliminary analyses

Life events descriptive analyses revealed that four dyads experienced separation or divorce; these couples were excluded from the sample. Moreover, since only four participants signalled the experience of a health-related event, this category was not considered in further analyses. Detailed life events descriptive statistics are provided (see Tables A1 to A3, appendix A).

Regarding ECR-SF items, all the univariate normality tests were significant; however these are sensitive to large samples, as was the case (Clark-Carter, 2004; Howell, 2010). Skewness and kurtosis' values were considered acceptable, thus assuring univariate normality. When assessing outlier values, we found seven dyads with multivariate outliers, and three couples with three or more univariate outliers in only one assessment wave. These ten couples were excluded from our study. The deletion of outliers and verification of univariate normality allowed us to assume multivariate normality (Kline, 2005).

Regarding attrition from time one to time two, men who dropped out were significantly older ( $M = 37.38$ ,  $SD = 5.21$ ) than those who participated in time two ( $M = 35.96$ ,  $SD = 4.96$ ),  $t(336) = -2.39$ ,  $p = .017$ . Women who dropped out were also significantly older ( $M = 35.88$ ,  $SD = 4.65$ ) than those who didn't ( $M = 34.81$ ,  $SD = 4.40$ ),  $t(335) = -2.02$ ,  $p = .044$ . Moreover, these drop-out couples had also been together for longer ( $M = 167.25$  months,  $SD = 59.00$ ) than those who participated in time two ( $M = 152.96$  months,  $SD = 55.94$ ),  $t(337) = -2.14$ ,  $p = .033$ . Women who dropped-out were also significantly less secure than women who participated in time two,  $t(290.38) = 2.07$ ,  $p = .039$ ,  $d = .17$ . Considering attrition from time one to time three, women who dropped-out ( $M = 35.94$ ,  $SD = 4.68$ ) were significantly older than those who participated in the third wave of assessment ( $M = 34.90$ ,  $SD = 4.39$ ),  $t(335) = -2.03$ ,  $p = .043$ . Drop-out dyads had been together for longer ( $M = 167.95$  months,  $SD = 58.33$ ) than those who participated in time 3 ( $M = 154.23$  months,  $SD = 57.50$ ),  $t(337) = -2.13$ ,  $p = .033$ . Regarding attrition from time two to time three, there are no differences between drop-out dyads and participants, in demographic or attachment variables.<sup>2</sup>

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<sup>2</sup> Drop-out couples were the parents of older children, and were expected to be older and to be in relationships for a longer period of time than other participants.

## 2. Dyadic confirmatory factor analyses

Dyadic CFA were separately conducted for each time wave. A missing value analysis using the Little Test showed a MCAR pattern in all three moments, except when considering all ECR-SF items at once, or only female participants (see Table B1, appendix B). Full Information Maximum Likelihood (FIML) was used to handle these missing data (Brown, 2006).

A two-factor solution with anxiety and avoidance was tested separately for each time wave. This model fit our data only after adding covariances between observable variables' errors,  $\chi^2/df = 1.97$ , CFI = .83, RMSEA [C.I. 90%] = .08 [.07 - .09]. We then tested a three-factor solution, in a similar approach to the one adopted by Ávila et al. (2015). Three of the six items measuring avoidance displayed moderate to low negative correlations with this dimension; we therefore added a third dimension from these items – *security*. Detailed analyses allowed the deletion of items with low correlations to their respective latent variable (anxiety items 1, 7, and 10), and the addition of covariances between observable variables' errors (between item 6 and item 8 error variables in men). The final solution (see Table 1) displayed the best model fit and includes anxiety (as measured by items 4, 6, and 8), avoidance (as measured by items 2, 3, and 5), and security (as measured by items 9, 11, and 12). In all time waves, avoidance and anxiety presented high correlations, and security was moderately and negatively correlated with anxiety and avoidance. Item 6 (*I need a lot of reassurance that I am loved by my partner*) displayed the lower estimates in all moments of assessment, presenting low to moderate correlations with anxiety in men and women. For all estimates and correlations, see Tables B2 and B3, appendix B.

Table 1.  
*Dyadic confirmatory factor analysis: three-factor solution*

Time waves	$\chi^2$	$df$	$\chi^2/df$ , $p$	CFI	RMSEA [C.I. 90%]
T1	254.02	116	2.19 $p < .001$	.88	.09 [.08 - .11]
T2	215.53	116	1.86 $p < .001$	.85	.09 [.07 - .11]
T3	203.02	116	1.75 $p < .001$	.90	.08 [.06 - .10]

### 3. Measurement invariance

Relational measurement invariance was tested for each time wave. For the first moment of assessment, we found evidence for full configural and factor covariance invariance, and for partial scalar (unconstraining items 6, 9, and 11 intercepts) and strict (unconstraining item 11 residual variance) invariance. For the second wave of assessment, we found full configural and factor covariance invariance, as well as partial metric (unconstraining item 6 factor loading), scalar (unconstraining items 8, 9, and 10 intercepts), and strict (unconstraining items 6, 9, and 11 residual variance) invariance. For the third assessment wave, we found full configural and factor covariance invariance, but scalar (unconstraining items 3, 8, 9, and 12 intercepts) and strict (unconstraining items 6, 9, and 11 residual variance) partial invariance. Despite our findings of partial invariance, literature shows that we can, nevertheless, proceed with further analyses (Byrne, Shavelson & Muthén, 1989). For detailed information, see Tables C1 to C3, appendix C.

### 4. Reliability

As seen on Table 2, the computing of McDonald's Omega hierarchical coefficient ( $\omega_h$ ) showed acceptable to very good reliabilities, except for women's anxiety in time 1, which was adequate ( $\omega_h = .66$ ). When compared to alpha coefficient ( $\alpha$ ),  $\omega_h$  provided higher scores (see table D1, appendix D).

Table 2.  
*Reliability analysis: Hierarchical Omega coefficient ( $\omega_h$ )*

$\omega_h$			
Time wave	Security	Avoidance	Anxiety
Time 1			
Men	.84	.94	.83
Women	.81	.90	.66
Time 2			
Men	.79	.85	.76
Women	.80	.93	.76
Time 3			
Men	.84	.91	.74
Women	.88	.90	.73

## 5. Analysis of attachment stability and change

Our goal was to analyse stability and change in attachment throughout three waves of assessment. Therefore, for our second set of analyses, we included only those couples who participated in all the moments of our study (i.e., 80 couples). Latent variables (i.e., anxiety, avoidance, and security) were obtained from previous CFA analyses through imputation of scores from AMOS to SPSS. However, these are centered variables (i.e., each score represents a deviation from the mean), making it difficult to interpret the obtained scores. Interpretable variables were computed using SPSS, calculating the mean of the ECR-SF items for each dimension. Means and standard deviations are presented in Table 3, in order to facilitate the interpretation of results obtained, since we used centered variables in all forthcoming analyses.

Table 3.  
*Anxiety, avoidance, and security: means and standard deviations*

Dimension	Gender	Time wave	<i>M</i>	<i>SD</i>
Anxiety	Men	T1	2.48	1.31
		T2	2.60	1.08
		T3	2.87	1.21
	Women	T1	2.60	1.21
		T2	2.27	1.03
		T3	2.74	1.18
Avoidance	Men	T1	1.83	1.20
		T2	1.53	.79
		T3	1.84	1.10
	Women	T1	1.89	1.30
		T2	1.70	1.11
		T3	2.08	1.40
Security	Men	T1	5.63	1.31
		T2	5.94	1.21
		T3	5.73	1.09
	Women	T1	6.18	.94
		T2	6.31	.84
		T3	6.20	.98

Paired-samples *t*-tests were performed to analyse gender differences in all dimensions, for each moment of assessment. Men and women differed only in their avoidance levels in time two, with women displaying higher avoidance levels than men,  $t(79) = -4.95, p < .001, d = .17$  (see Table 4).

Table 4.  
*Dimension differences within-dyad across time waves*

Time waves	Dimensions								
	Security			Anxiety			Avoidance		
	<i>t</i>	<i>df</i>	<i>p</i>	<i>t</i>	<i>df</i>	<i>p</i>	<i>t</i>	<i>df</i>	<i>p</i>
Time 1	.58	79	.561	-.19	79	.848	.48	79	.635
Time 2	1.32	79	.192	1.82	79	.073	-4.95	79	<.001
Time 3	-1.34	79	.184	-.79	79	.433	.82	79	.417

Several correlation analyses were conducted to evaluate the relationship between all variables. Anxiety and avoidance were strongly correlated (Men - Time one:  $r = .87, p < .001$ ; Time two:  $r = .66, p < .001$ ; Time three:  $r = .82, p < .001$ ; Women - Time one:  $r = .99, p < .001$ ; Time two:  $r = .73, p < .001$ ; Time three:  $r = .98, p < .001$ ). This raised a multicollinearity issue and forced us to exclude one of these dimensions. As security was computed using inversely scored avoidance items, we expected less variability between

these two dimensions. This led us to exclude avoidance from further work. Considering only anxiety and security as attachment variables, there was no multicollinearity.

Correlations between these two dimensions showed moderate negative correlations between anxiety and security in all assessment waves, in both men and women. Moreover, we did not find high dyadic correlations between attachment dimensions. Men and women's anxiety were moderate and positively correlated in times one and three, but negatively correlated in time two. Security levels between genders were also moderate and positively correlated in all time waves (see Table E1, appendix E).

Four one-way repeated measures ANOVA were conducted to compare scores on anxiety and security dimensions between the three waves of assessment, for both men and women (see Table 5). All assumptions were met, apart from sphericity when testing Security<sup>3</sup>. For women's anxiety, the effect of time was significant,  $F(2, 158) = 5.78, p = .004, \eta_p^2 = .07$  (see Figure F, appendix F). Pairwise comparisons using Bonferroni correction (see Table F1, appendix F) indicated that women's anxiety was lower in time two than in time one ( $p = .008$ ) and time 3 ( $p = .007$ ).

Table 5.  
*Repeated measures ANOVA with Anxiety and Security*

Dimensions	F	df	Error df	p	$\eta_p^2$	Observed power
Anxiety Men	.36	2	158	.698	.005	.11
Anxiety Women	5.78	2	158	.004	.068	.86
Security Men	.77	1.77	139.58	.450	.010	.17
Security Women	2.03	1.86	147.1	.139	.025	.40

Linear and hierarchical multiple regressions were performed to analyse which factors predicted changes in anxiety and security from time two to time three, in both men and women. New variables depicting this change were created by subtracting the dimension's scores in time two to its respective scores in time three, and were used as dependent variables in following regression analyses.

Multiple regressions using enter method were conducted separately to test the power of the following blocks: a) demographic variables, b) actor variables, c) partner variables, and d) life events variables, in predicting men and women's anxiety and security change from time 2 to time 3 (see Tables G1 to G4, appendix G). Only predictors that were found

<sup>3</sup> For men and women's security, this assumption was violated,  $\chi^2(2) = 5.52, p = .004$  and  $\chi^2(2) = 3.02, p = .004$ , respectively. Degrees of freedom were corrected using Greenhouse-Geisser estimates ( $\epsilon = .88$  and  $\epsilon = .93$ , respectively).



significant in each of the previous regression analyses were then used in unique hierarchical multiple regressions. The assumptions of these statistical analyses were tested and generally verified<sup>4</sup>. The occurrence of life events and their dyadic impact (positive versus negative) for each category (work-related and interpersonal/family-related) were entered as dummy variables.

The first hierarchical multiple regressions were performed entering actor variables in the first block and partner variables in the second block. When there was only one predictor, linear regressions were performed (see Table G5, appendix G).

Results show that an increase in men's anxiety from time two to time three was predicted by men's security in time one ( $\beta = .24, p = .021$ ) and time two ( $\beta = .28, p = .010$ ), as well as by women's anxiety in time two ( $\beta = .29, p = .006$ ),  $R^2 = .23$ ,  $F(3, 76) = 7.56, p < .001$ . An increase in women's anxiety was only marginally predicted by men's anxiety levels in time two,  $R^2 = .048$ ,  $F(1, 78) = 3.95, p = .051$ ,  $\beta = .22$ .

An increase in men's security from time two to time three was predicted by men's anxiety in time two ( $\beta = .25, p = .018$ ), while a decrease in these levels was predicted by women's security in time two ( $\beta = -.30, p = .006$ ),  $R^2 = .17$ ,  $F(2, 77) = 7.83, p = .001$ . Moreover, a decrease in women's security from time two to time three was predicted by women's anxiety in time one ( $\beta = -.24, p = .031$ ),  $R^2 = .058$ ,  $F(1, 78) = 4.80, p = .031$ .

Subsequent hierarchical multiple regressions were performed selecting only those couples who experienced any life event. This was made to test for the power of a) previously identified models with actor and partner variables, and b) previously identified significant life event predictors (number of self, partner, and dyad life events; dyadic impact of life events) in predicting change in attachment dimensions from time two to time three. These variables were identified as significant predictors of changes in men's security (see Table G6, appendix G).

Change in men's security was significantly predicted by a model with men's anxiety in time two and women's security in time two,  $R^2 = .17$ ,  $F(2, 77) = 7.83, p = .001$ . When adding life events variables in the third block, the final model significantly predicted this change,  $R^2 = .36$ ,  $F(5, 45) = 5.13, p = .001$ . An increase in men's security was predicted by men's anxiety in time two ( $\beta = .34, p = .009$ ); a decrease in these levels was predicted by women's security in time two ( $\beta = -.27, p = .045$ ), and by the dyad's experience of positive interpersonal events ( $\beta = -.30, p = .026$ ). The number of life events now presented a non-

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<sup>4</sup> In multiple regressions with number and impact of events, distributions were more negatively skewed and platykurtic.

significant impact of change in men's security. When repeating this analysis using only men's anxiety in time two, women's security in time two, and the dyad's experience of positive interpersonal events, the model was still significant,  $R^2 = .34$ ,  $F(3, 62) = 10.49$ ,  $p < .001$ . However, the dyad's experience of positive interpersonal events was only marginally significant ( $\beta = -.21$ ,  $p = .050$ ).

## IV. Discussion

### 1. Assessing the ECR-SF psychometric properties

Regarding the first part of our study, we found that the ECR-SF's two-factor structure did not fit our sample. A three-factor solution, similar to Ávila et al.'s (2015), was adopted and presented a better model fit. Anxiety and avoidance presented high positive correlations with each other, as well as moderate to high negative correlations with security. These results suggest that a) the questionnaire used might not have been successful in discriminating these two dimensions of attachment insecurity, and b) in our sample, anxiety and avoidance are not independent dimensions. When we look at the interpretable variables' scores, we see that our sample presented lower levels of both anxiety and avoidance, i.e., the scores are predominantly in the inferior side of the scale for these dimensions. This pattern might explain the relationships between the three variables.

Low scores on both anxiety and avoidance are not surprising<sup>5</sup>, since our sample comes from Portugal's general community (i.e., it is not a clinical or a risk sample) and was recruited using a convenience sampling method. However, these scores can be a result of social desirability. Additionally, anxiety and avoidance were highly correlated in men and women, which suggests the possibility of anxiety and avoidance reporting to the same underlying structure, insecurity, which opposes security.

Partial relational measurement invariance was found. For the first and third assessment waves, we found full configural, metric, and factor covariance invariance, showing that the questionnaire had the same structure for both men and women at times one and three, they both attributed the same meaning to each one of the constructs, and the relationship between dimensions was similar across gender. Partial scalar and strict invariance was found for these assessment waves. In time one, men and women interpreted items 6, 9, and 11 differently, and the measurement error associated with item 11 varied with gender. In time three, items 3, 8, 9, and 12 were interpreted differently across gender, and the measurement error associated with item 9 was also different between men and women.

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<sup>5</sup> We found that drop-out women from time one were less secure than women who participated in time two, reflecting a possible discomfort when facing relationship-related and emotion-focused questions (Mikulincer & Shaver, 2007). However, this result presents a low effect size (Field, 2009).

For the second assessment wave, full configural and factor covariance invariance were found: the questionnaire presented the same structure for both men and women at time two, and the relationship between the dimensions was similar across gender. However, we found partial metric, scalar, and strict invariance: men and women associated item 6 with different constructs, interpreted items 8, 9, and 11 differently, and the measurement error was different for items 6, 9, and 11. Thus, for this assessment, we need caution when comparing ECR-SF scores across gender, especially time two scores and anxiety-related scores (i.e., 6 and 8), since some items may be interpreted differently by men and women (Tagliabue & Lanz, 2014; van de Schoot, Lugtig & Hox, 2012).

We also found evidence for adequate to very good reliabilities in all dimensions and time waves, for both men and women. The lowest  $\omega_h$  was obtained for women's anxiety in time one. These results showed that the used measure is overall consistent (Clark-Carter, 2004). In general, we obtained higher  $\omega_h$  scores than  $\alpha$  scores, which was consistent with existent literature (Cho & Kim, 2015; Dunn, Baguley & Brunsden, 2013).

## **2. Attachment stability and change<sup>6</sup>**

Unlike findings in present literature regarding gender differences in attachment, we found that men presented lower levels of avoidance than women, in the second wave of assessment. The similarity in anxiety and security levels is aligned with existing literature about attachment dimensions within dyad, which states that partners influence one another and mimic their attachment behaviours (Gillath, Karantzas, & Fraley, 2016). The avoidance-related results raise the possibility of changing traditional gender roles. Nevertheless, these results were low in effect size, which means this difference may not be substantial. Moreover, they can be the result of measurement-related issues: time two's partial relational invariance reveals that items can be interpreted differently across gender.

We found evidence for more stability than change in attachment dimensions throughout the three assessment waves. The effect of time was only significant in women's anxiety: women became less anxious from time one to time two, and increased their anxiety levels again at time three. These results sustain Bowlby's idea about the stability of working models and attachment dimensions (Bowlby, 1988), but also open the possibility of change

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<sup>6</sup> Since avoidance was excluded from the analyses, we could not test its stability and change. We tested for the variability of the created *security* dimension instead.

(Gillath, Karantzas, & Fraley, 2016). Despite its medium effect size, this anxiety variation could be attributed to measurement-related issues (i.e., anxiety-related item 6 presented low to moderate positive correlations, and time two's partial relational invariance signals that anxiety-related items can be interpreted differently across gender).

Although there were no other significant changes, we detected fluctuations in men and women's security and anxiety.

Men with higher security levels in the first and second assessments became more anxious between times two and three; this increase was also predicted by their partners' higher anxiety levels in time two. These are curious findings: it seems that secure men became more anxious throughout time, and this trajectory was also influenced by their partners' anxiety. Regarding women, an increase in women's anxiety between times two and three was marginally influenced by their partners' anxiety. These results showed that for women's significant anxiety variations (as seen in a previous analysis), the decrease in these levels from time two to time three was only marginally explained by their partners' lower anxiety levels. On the other hand, men's security decreased if their partners were more secure; however, their own security increased when they were more anxious in time two. Moreover, more anxious women became less secure throughout time. Individuals seemed to be more prone to their partners' anxiety fluctuations, and responded to their anxiety increase (i.e., more intense search for reassurance, comfort, and doubts about rejection) displaying even more anxiety-related behaviours. These findings are in line with Hudson et al.'s (2014) study, sustaining for some coregulation effects happening prospectively: one's anxiety fosters their partners' anxiety. Furthermore, men and women maintained moderate positive correlations between their attachment dimensions in assessment waves one and three. In time two, the correlation between men and women's anxiety was negative; we hypothesize this was a result of the significant change in women's anxiety in this time wave. However, time two presents not full but partial metric invariance, with possible different interpretations across gender for some items, which might interfere with these results.

Considering other literature on attachment coregulation (Overall & Lemay, 2015; Overall & Simpson, 2015), we can also hypothesize that participants respond to more anxious partners by fostering intimacy and proximity, displaying positive emotions, and reassuring them of their love and affection. This display would prone individuals to manifest more anxiety-related characteristics (such as high proximity and intimacy seeking) in a posterior assessment. In fact, both men and women presented higher levels of anxiety in time three if their partner also displayed higher levels of anxiety in previous reports. This was

particularly preeminent in more secure men, and was marginally observed in women. In men, their own higher anxiety levels and their partners' lower security levels would still prospectively predict an increase on their own security, reinforcing the hypothesis that men's increased anxiety was only a fluctuation and a consequence of dyadic regulatory processes. For women, nevertheless, higher anxiety levels would prospectively predict a decrease in their security levels, maybe reflecting that their partners' efforts to respond to their needs were not sufficient to assuage them.

We expected the experience of life events would help explain these attachment's variations beyond coregulation processes. Nevertheless, these events did not influence attachment's stability and change within dyad in expected directions.

The experience of some life event was not predictive of any attachment variability *per se*. Other life events variables (i.e., number of experienced events and the dyadic impact of events) were only significant predictors of men's security changes. Moreover, when included in the same model than actor and partner attachment variables, they seemed to lose their predictive power. We hypothesized that attachment dimensions explain a greater deal of security variability than life events. As such, attachment variability would be better explained by internal vulnerability individual variables (for instance, past history of psychopathology), which can predispose individuals for attachment fluctuations through time (e.g., Davila, Burge, & Hammen, 1997; Davila, Karney, & Bradbury, 1999). In a model with attachment and life events variables, only the experience of positive interpersonal events contributed to a decrease in men's security from time two to time three. This is also an interesting finding: according to existing literature, it is the experiencing of negative life events that leads to a decrease in security levels (Davila & Sargent, 1993).

We suggest some explanations for this unexpected finding. First, the interpersonal events were classified as positive by the *dyad*, i.e., by the male *or* female member of the couple. It is possible that only women signalled some interpersonal occurrences as positive, and men did not attribute the same meaning to those occurrences. Second, the variability in attachment dimensions might not be significant; in fact, we only found evidence for a significant decrease in women's anxiety in time two. Finally, we hypothesize that the experience of interpersonal change can activate men's attachment system, even if such change is experienced positively. Perhaps these occurrences, although felt as positive, are emotionally demanding and lead to an activation of the attachment system. As a response, men would lower their security levels, either turning to their partners for proximity and reassurance, or withdrawing. If we consider traditional gender roles, we can speculate that

men, who are better characterized by avoidance behaviours, would withdraw and not be able to communicate emotionally and openly with their partners in the face of a life-changing relational event (Mikulincer & Shaver, 2007).

### **3. Strengths and limitations**

Our work focused first on the assessment of the ECR-SF psychometric properties. Through specific statistical procedures, we examined a) the questionnaire's factor structure and how it fit our sample, b) the invariance of measured constructs across gender, and c) the measure's reliability. Modifying the instrument's latent structure allowed us to obtain a more reliable measure of attachment in our study. By verifying relational invariance and the questionnaire's reliability, we were assuring the adequacy of comparisons within dyad and the validity of our results.

The inclusion of an impact variable in the life events' questionnaire allowed us to access the subjective meaning attributed to each occurrence, and assess its influence on attachment dimensions. Following Davila and Sargent's work (2003), we believed that the subjective construction of events, as well as the way each dyad integrates such event on their own narrative, would determine the occurrence's impact on attachment dynamics and orientations. These life events were assessed at two moments of the study, seven months and nineteen months after the first assessment. Such multiple assessments allowed participants to present a broader number of occurrences. This questionnaire was also designed to allow each subject to specify any event they deemed significant. As such, it could capture the diversity of occurrences and their subjective impact. Indeed, 66 dyads experienced at least one life event; work-related events were the most reported occurrences (see table A1, appendix A). Intuitively, we would explain this finding through Portugal's social and economic scenario, which fosters unemployment and financial difficulties. However, many participants reported professional progressions and other occurrences (e.g., change of work place) as positive. Our data thus highlighted the importance of asking individuals about the impact each event had on their lives, and to observe how it reflects dyadically.

The growing time intervals between assessments – seven months between first and second assessments, one year between second and third assessments – allowed for the possible expression of growing attachment changes, since these changes can take place slowly over time (Bowlby, 1988; Davila, Burge, & Hammen, 1997).

Moreover, our findings regarding attachment coregulation within dyad can inform clinical settings and their perspective on distressed couples seeking therapy. The obtained results enhance the pertinence of communication and emotion-regulation as topics to be exercised within individual and couple therapy. Helping individuals to develop effective communication strategies and emotion-regulation techniques will help them assuage themselves, their partners, and to respond better to their partners' needs.

Despite its strengths, our study presents limitations that cannot be overlooked. First, the overall time interval (nineteen months) might not have been broad enough to observe more attachment fluctuations. Although we found a significant difference of women's anxiety levels across time, this difference was not substantial. However, this could be better assessed if we tested for the predictive power of actor and partner variables in women's anxiety change from time one to time two, and from time two to time three.

Furthermore, we did not conduct longitudinal measurement invariance: the consistency of the ECR-RS questionnaire through each assessment wave was not statistically assured. The obtained life events variables were grouped into broader categories for statistical purposes, and some variability may have been lost through this process. We regarded the events' impact only dyadically. Indeed, dyadic positive impact of interpersonal events influenced men's security decrease prospectively. Specifying life-events' impact through gender would help explain these results (e.g., did men who decreased their security levels signalled positive interpersonal events? Or was it their partners who signalled such impact?) and would be a source of variability.

We did not assess stability and change in avoidance. Given the multicollinearity issues we have encountered, we were forced to exclude one of the insecurity dimensions; for statistical reasons, we excluded avoidance. As such, we were not able to compare this dimension with other attachment variables, examine its role in dyadic coregulation, or to assess its variability through time and the experience of life events. Finally, our sample dimension (80 dyads) did not allow us to perform more sophisticated statistical analysis for the assessment of attachment trajectories.

#### **4. Suggestions for future research**

Future studies should attend to gaps in existing literature, as well as to our own study's limitations. It would be of interest to replicate our study using broader time intervals,



to assess how attachment dimensions vary throughout longer periods of time. The use of a larger sample would allow for trajectories' study using more refined statistical methods and softwares (e.g., Anderson, Van Ryzin, and Doherty, 2010). Avoidance should also be included in these analyses, allowing researchers to study this dimension within dyads through time, and its relationship with anxiety, security, and the experience of life events.

These events' specificity would be further assessed if more fine variables (e.g., events' impact across gender) were considered in statistical analysis. A larger sample would help assure this goal, since it would improve the statistical power and allow researchers to include a broader number of variables in each analysis. Also, it would permit to test mediational models, analysing whether change in one partner is mediated by the other partner's change, and thus gathering more information for testing a coregulation model within the couple. Moreover, considering the impact on positive interpersonal events on men, it would be interesting to replicate this study and identify men who experienced positive life events and whose security, anxiety, or avoidance levels varied. Interviews could be conducted on these participants, as to better understand the impact of these occurrences and the attachment dynamics involved.

Following findings regarding possible stable factors accounting for attachment fluctuations, we suggest that future works include measures of vulnerability variables (e.g., depression; Davila, Burge, & Hammen, 1997), to examine this hypothesis. Furthermore, the examination of attachment regulation in couples seeking therapy would be another topic of interest, allowing us to study the regulatory processes in distressed and conflicted dyads.

Concerning the ECR-SF psychometric properties, and given the obtained results on the CFA, it would be of interest to study a model using security and insecurity, where insecurity would be a second-order factor accounting for anxiety and avoidance. The testing of longitudinal measurement invariance would help assure the used measure's consistency in all waves of assessment. Moreover, the assessment of the factor structure and relational invariance are lacking in existing literature. To study these aspects would be to contribute to a further exploration and validation of this instrument.

Our work was based on studies focusing stability and change in attachment in heterosexual couples. It would be interesting to expand such research to homosexual dyads, exploring attachment dynamics, life events, and relationship variables within these couples.

## **Conclusion**

With our study, we intended to expand existing literature about stability and change in romantic attachment through time. Despite its limitations, our research was consistent with the existing literature on the topic, presenting results supportive of stability, while making room for some variability. Contrary to our expectations, we found that experiencing positive interpersonal events had an impact on these changes, but only in men.

Our study provided evidence for attachment coregulation within dyad: anxiety seems to generate more anxiety. Seeking for constant reassuring and worrying about abandonment seem to provoke similar behaviours and emotions in one's partner. Our sample may struggle to respond to their partners' needs and to assuage them. This alerts us to the importance of focusing on emotion-regulation strategies in clinical, educational, or organization settings. However, there might be other coregulation strategies happening: men seem to increase their proximity to their anxious partners, as a response to their needs. Men may later report higher anxiety and lower security levels as a consequence to this strategy. Life events did not explain these results as expected. We hypothesized, however, that positive interpersonal events could be emotionally demanding for men, thus activating their attachment system. These findings highlight the pertinence of future studies regarding attachment dimensions' stability and change in the Portuguese culture, and they also stress the importance to further examine life events' subjective meanings and their impact on attachment.

Romantic attachment, even though it arises from each individual's life story, can be shaped throughout time within an intimate relationship, according to the partners' own life story, world of meaning, and behaviour. As such, romantic relationships are not only the foundation for family, but also a context where we continue to develop – shaping our partners' story, and allowing them to be a part of ours.

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## **APPENDIX**

## Appendix A

### Life events: Descriptive statistics

Table A1.

*Number of participants experiencing life events.*

Participants	Life event category					
	Time 2		Time 3		Total	
	Work	Interpersonal	Work	Interpersonal	Work	Interpersonal
Men	21	13	36	17	43	25
						51
Women	26	21	35	26	48	35
						62
Dyads	32	23	50	30	59	39
		39		58		66

Table A2.

*Number of experienced life events: Means and standard deviations.*

Participants	Life event category									
	Time 2				Time 3				Total	
	Work		Interpersonal		Work		Interpersonal			
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Men	1.52	.81	1.23	.44	1.57	.77	1.25	.45	2.47	1.46
Women	1.58	.70	1.19	.40	1.54	.70	1.42	.58	2.49	1.57
Dyad	2.67	.90	2.55	.69	3.29	1.06	2.92	.76	4.29	2.65

Table A3.  
*Number of couples experiencing positive and negative life events.*

Impact	Life event category		
	Work	Interpersonal	Total
Positive	44	21	53
Negative	32	25	44
Positive and Negative	20	11	33

## Appendix B

### Dyadic Confirmatory Factor Analysis

Table B1.

*Missing completely at random pattern: Little test.*

Variables	$\chi^2$	<i>df</i>	<i>p</i>
All the ECR variables	568.79	511	.039
Time 1	0	0	
Time 2	7.41	12	.830
Time 3	111.60	91	.070
Men	94.43	83	.184
Women	187.89	128	< .001

Table B2.

*Items' estimates: three-factor solution.*

Security						
Items	T1		T2		T3	
	Men	Women	Men	Women	Men	Women
Item 9	.68	.57	.41	.40	.55	.56
Item 11	.66	.74	.78	.89	.90	.92
Item 12	.81	.82	.76	.75	.68	.79

Anxiety						
Items	T1		T2		T3	
	Men	Women	Men	Women	Men	Women
Item 4	.84	.70	.91	.91	.78	.83
Item 6	.51	.32	.22	.42	.25	.37
Item 8	.53	.57	.49	.51	.58	.53

Avoidance						
Items	T1		T2		T3	
	Men	Women	Men	Women	Men	Women
Item 2	.75	.71	.60	.74	.72	.76
Item 3	.91	.87	.72	.87	.83	.69
Item 5	.91	.81	.82	.90	.89	.92



Table B3.  
*Latent variables correlations: three-factor solution.*

Dimensions	Correlations		
	T1	T2	T3
Anxiety Men – Avoidance Men	.79	.61	.73
Anxiety Men – Security Men	-.30	-.30	-.37
Avoidance Men – Security Men	-.41	-.47	-.26
Anxiety Women – Avoidance Women	.98	.83	.93
Anxiety Women – Security Women	-.43	-.36	-.48
Avoidance Women – Security Women	-.55	-.40	-.41
Anxiety Men – Anxiety Women	-.016	-.18	.087
Avoidance Men – Avoidance Women	.039	.037	-.014
Security Men – Security Women	.38	.25	.21

## Appendix C

### Measurement Invariance

Table C1.  
Time 1: full and partial invariance models.

Configural invariance				
$\chi^2$	$df$	$p$	CFI	RMSEA
254.02	116	2.19	<.001	.88
Metric invariance				
$\chi^2$	$df$	$p$	CFI	RMSEA
271.25	125	<.001	.87	.09
$\Delta\chi^2$	$\Delta df$	$p$	$\Delta CFI$	$\Delta RMSEA$
17.23	9	.045	.007	.001
Scalar invariance – releasing items 6, 9 and 11 intercepts				
$\chi^2$	$df$	$p$	CFI	RMSEA
281.63	131	<.001	.87	.089
$\Delta\chi^2$	$\Delta df$	$p$	$\Delta CFI$	$\Delta RMSEA$
10.40	6	.109	.004	.001
Strict invariance – releasing item 11's residual variance				
$\chi^2$	$df$	$p$	CFI	RMSEA
298.53	139	<.001	.86	.089
$\Delta\chi^2$	$\Delta df$	$p$	$\Delta CFI$	$\Delta RMSEA$
16.90	8	.032	.007	0
Factor covariance invariance				
$\chi^2$	$df$	$p$	CFI	RMSEA
306.43	142	<.001	.86	.09
$\Delta\chi^2$	$\Delta df$	$p$	$\Delta CFI$	$\Delta RMSEA$
7.9	3	.048	.004	.001

Table C2.  
Time 2: full and partial invariance models.

Configural invariance				
$\chi^2$	<i>df</i>	<i>p</i>	CFI	RMSEA
215,53	116	<.001	.85	.094
Metric invariance – releasing item 6				
$\chi^2$	<i>df</i>	<i>p</i>	CFI	RMSEA
234.52	124	<.001	.83	.095
$\Delta\chi^2$	$\Delta df$	<i>p</i>	$\Delta CFI$	$\Delta RMSEA$
1	1	.320	0	0
Scalar invariance – releasing items 9, 8 and 11 intercepts				
$\chi^2$	<i>df</i>	<i>p</i>	CFI	RMSEA
243.61	130	<.001	.82	.094
$\Delta\chi^2$	$\Delta df$	<i>p</i>	$\Delta CFI$	$\Delta RMSEA$
9,08	6	.169	.004	.001
Strict invariance – releasing items' 9, 6 and 11 residual variance				
$\chi^2$	<i>df</i>	<i>p</i>	CFI	RMSEA
249.77	136	<.001	.82	.092
$\Delta\chi^2$	$\Delta df$	<i>p</i>	$\Delta CFI$	$\Delta RMSEA$
6.16	6	.405	.001	.002
Factor covariance invariance				
$\chi^2$	<i>df</i>	<i>p</i>	CFI	RMSEA
255.68	139	<.001	.82	.093
$\Delta\chi^2$	$\Delta df$	<i>p</i>	$\Delta CFI$	$\Delta RMSEA$
5.91	3	.116	.005	.001

Table C3.  
Time 3: full and partial invariance models.

Configural invariance				
$\chi^2$	$df$	$p$	CFI	RMSEA
203.02	116	<.001	.90	.077
Metric invariance				
$\chi^2$	$df$	$p$	CFI	RMSEA
218,12	125	<.001	.89	.077
$\Delta\chi^2$	$\Delta df$	$p$	$\Delta CFI$	$\Delta RMSEA$
15.10	9	.088	.007	0
Scalar invariance – releasing items 3, 9, 12 and 8 intercepts				
$\chi^2$	$df$	$p$	CFI	RMSEA
231,45	130	<.001	.88	.079
$\Delta\chi^2$	$\Delta df$	$p$	$\Delta CFI$	$\Delta RMSEA$
13.33	5	.021	.010	.002
Strict invariance – releasing item 9's residual variance				
$\chi^2$	$df$	$p$	CFI	RMSEA
246,22	138	<.001	.87	.079
$\Delta\chi^2$	$\Delta df$	$p$	$\Delta CFI$	$\Delta RMSEA$
14,77	8	.064	.001	0
Factor covariance invariance				
$\chi^2$	$df$	$p$	CFI	RMSEA
253,31	141	<.001	.87	.08
$\Delta\chi^2$	$\Delta df$	$p$	$\Delta CFI$	$\Delta RMSEA$
7,09	3	.069	.005	.001

## Appendix D

### Reliability analysis

Table D1.  
*Reliability analysis:  $\alpha$  coefficients*

$\alpha$			
Time wave	Security	Avoidance	Anxiety
Time 1			
Men	.75	.88	.74
Women	.72	.82	.54
Time 2			
Men	.64	.72	.57
Women	.69	.87	.63
Time 3			
Men	.72	.84	.61
Women	.80	.81	.63

## Appendix E

### Correlations

Table E1.

*Correlations ( $r^2$ ): anxiety and security, all time waves.*

	Anxiety Men T1	Anxiety Women T1	Security Men T1	Security Women T1	Anxiety Men T2	Anxiety Women T2	Security Men T2	Security Women T2	Anxiety Men T3	Anxiety Women T3	Security Men T3	Security Women T3
Anxiety Men T1	1	.34**	-.36*	-.18	.21 <sup>a</sup>	-.13	-.19	-.032	-.022	.064	-.11	-.077
Anxiety Women T1		1	.049	-.50***	.069	-.075	.070	.15	.002	.13	.043	-.21 <sup>a</sup>
Security Men T1			1	.40***	-.26*	.037	.22 <sup>a</sup>	.018	.20 <sup>a</sup>	-.001	-.053	-.092
Security Women T1				1	-.052	.035	-.018	-.046	.002	-.054	.040	.038
Anxiety Men T2					1	-.28*	-.39***	-.12	-.068	.13	.053	.082
Anxiety Women T2						1	-.16	-.073	.080	.13	-.075	-.020
Security Men T2							1	.37**	.006	.016	.064	-.081
Security Women T2								1	.075	-.003	-.12	-.18
Anxiety Men T3									1	.40***	-.46***	-.32**
Anxiety Women T3										1	-.15	-.50***
Security Men T3											1	.43***
Security Women T3												1

<sup>a</sup> Marginally significant

\*.  $p < .05$

\*\*  $p < .010$

\*\*\*  $p < .001$

## Appendix F

### Repeated measures ANOVA

Table 1F.

*Repeated measures ANOVA pairwise comparisons: women's anxiety across time waves.*

Anxiety Women		Mean difference	SE	<i>p</i>
Time 1	Time 2	.40	.13	.008
	Time 3	-.050	.16	1.00
Time 2	Time 1	-.40	.13	.008
	Time 3	-.45	.14	.007
Time 3	Time 1	.050	.16	1.00
	Time 2	.45	.14	.007

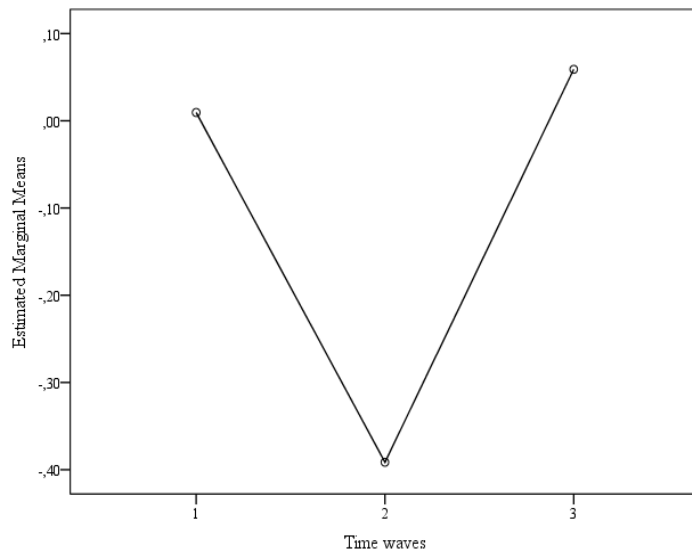


Figure F.

*Repeated measures ANOVA: women's anxiety across time.*

## Appendix G

### Regressions

Table G1.

*Multiple and linear regressions: Predictors of men's anxiety change from time 2 to time 3.*

Predictors	$R^2$	$F$	$df$	Error $df$	$p$	$\beta$
Demographic variables	.011	.42	2	77	.657	
Age						-.11
Relationship duration						.045
Actor variables	.15	6.65	2	77	.002	
Security Men T1						.27*
Security Men T2						.23*
Partner variables	.10	2.08	4	75	.092	
Security Women T1						.10
Security Women T2						.16
Anxiety Women T1						-.001
Anxiety Women T2						.26*
Life Events: Gone through at least one event	.041	1.07	3	76	.366	
Men						-.080
Women						.35
Couples						-.24
Number of Men Life Events	.027	1.36	1	49	.248	-.17
Number of Women Life Events	.007	.42	1	61	.521	.082
Number of Couple Life Events	.003	.21	1	64	.647	-.057
Impact of Dyad's Life Events	.013	.42	2	63	.658	
Positive Impact						.065
Negative Impact						-.083
Impact of Dyad's Work Events	.014	.45	2	63	.639	
Positive Impact						.078
Negative Impact						-.083
Impact of Dyad's Interpersonal Events	.008	.26	2	63	.770	
Positive Impact						.087
Negative Impact						-.050

<sup>a</sup> Marginally significant

\*  $p < .05$



Table G2.

*Multiple and linear regressions: Predictors of women's anxiety change from time 2 to time 3.*

Predictors	$R^2$	$F$	$df$	Error $df$	$p$	$\beta$
Demographic variables	.012	.48	2	77	.621	
Age						-.054
Relationship duration						-.076
Actor variables	.004	.16	2	77	.851	
Security Women T1						-.060
Security_Women_T2						.021
Partner variables	.087	1.79	4	75	.140	
Security Men T1						.055
Security Men T2						.19
Anxiety_Men_T1						.10
Anxiety Men T2						.29*
Life Events: Gone through at least one event	.020	.52	3	76	.673	
Women						-.26
Men						.020
Couples						.24
Number of Women Life Events	.029	1.81	1	61	.184	-.17
Number of Men Life Events	.003	.15	1	49	.702	-.055
Number of Couple Life Events	.012	.79	1	64	.377	-.11
Impact of Dyad's Life Events	.014	.45	2	63	.641	
Positive Impact						-.075
Negative Impact						.079
Impact of Dyad's Work Events	.023	.75	2	63	.475	
Positive Impact						-.055
Negative Impact						.14
Impact of Dyad's Interpersonal Events	.010	.32	2	63	.730	
Positive Impact						-.026
Negative Impact						-.091

\* $p < .05$ .

Table G3.

*Multiple and linear regressions: Predictors of change in men's security from Time 2 to Time 3.*

Predictors	$R^2$	$F$	$df$	Error $df$	$p$	$\beta$
Demographic variables	.011	.45	2	77	.641	
Age						.12
Relationship duration						-.055
Actor variables	.084	3.51	2	77	.035	
Anxiety_Men_T1						-.029
Anxiety_Men_T2						.29*
Partner variables	.109	20.30	4	75	.066	
Security_Women_T1						.035
Security_Women_T2						-.33**
Anxiety_Women_T1						.060
Anxiety_Women_T2						.019
Life Events: Gone through at least one event	.044	1.17	3	76	.33	
Men						.093
Women						-.20
Couples						.27
Number of Men Life Events	.11	5.94	1	49	.019	.33*
Number of Women Life Events	.034	2.12	1	61	.15	.18
Number of Couple Life Events	.069	4.72	1	64	.033	.26*
Impact of Dyad's Life Events	.005	.17	2	63	.847	
Positive Impact						-.062
Negative Impact						.028
Impact of Dyad's Work Events	.046	1.51	2	63	.229	
Positive Impact						.18
Negative Impact						.14
Impact of Dyad's Interpersonal Events	.061	2.05	2	63	.138	
Positive Impact						-.25*
Negative Impact						.069

\*  $p < .05$ \*\*  $p < .010$

Table G4.

*Multiple and linear regressions: Predictors of change in women's security from Time 2 to Time 3.*

Predictors	$R^2$	$F$	$df$	Error $df$	$p$	$\beta$
Demographic variables	.027	1.08	2	77	.345	
Age						.19
Relationship duration						-.080
Actor variables	.058	2.37	2	77	.100	
Anxiety_Women_T1						-.24*
Anxiety_Women_T2						-.002
Partner variables	.068	1.36	4	75	.256	
Security_Men_T1						-.071
Security_Men_T2						-.22 <sup>a</sup>
Anxiety_Men_T1						-.13
Anxiety_Men_T2						.042
Life Events: Gone through at least one event	.022	.58	3	76	.360	
Women						-.057
Men						.15
Couples						-.12
Number of Women Life Events	.028	1.74	1	61	.192	.17
Number of Men Life Events	.027	1.39	1	49	.245	.17
Number of Couple Life Events	.041	2.76	1	64	.102	.20
Impact of Dyad's Life Events	.002	.067	2	63	.936	
Positive Impact						-.040
Negative Impact						-.032
Impact of Dyad's Work Events	.026	.85	2	63	.433	
Positive Impact						.16
Negative Impact						-.017
Impact of Dyad's Interpersonal Events	.025	.79	2	63	.456	
Positive Impact						-.11
Negative Impact						.14

<sup>a</sup> Marginally significant\*  $p < .05$ .

Table G5.

*Hierarchical multiple regressions/ linear regressions with predictors of change in Anxiety and Security, in men and women, from time 2 to time 3.*

	$\Delta R^2$	$F$	$df$	Error $df$	$p$	$\beta$
Anxiety predictors						
Men						
Actor variables	.15	6.65	2	77	.002	
Security_Men_T1						.27*
Security Men T2						.23*
Adding partner variables	.23	7.56	2	77	<.001	
Security_Men_T1						.24*
Security Men T2						.28*
Anxiety Women T2						.29**
Women						
Anxiety_Men_T2	.048	3.95	1	78	.051	.22 <sup>a</sup>
Security predictors						
Men						
Actor variables	.083	7.04	1	78	.010	
Anxiety Men T2						.29*
Adding partner variables	.17	7.83	2	77	.001	
Anxiety Men T2						.25*
Security Women T2						-.30**
Women						
Anxiety Women T1	.058	4.80	1	78	.031	-.24*

<sup>a</sup> Marginally significant

\*  $p < .05$

\*\*  $p < .010$ .

Table G6.

*Hierarchical multiple regressions/ linear regressions including Life Events as predictors of change in men's security, from time 2 to time 3.*

	$\Delta R^2$	$F$	$df$	Error $df$	$p$	$\beta$
Actor variable	.11	5.89	1	49	.019	
Anxiety Men_T2						.36*
Adding partner variable	.26	8.32	2	48	.001	
Anxiety_Men_T2						.32*
Security Women_T2						-.39**
Adding Number of Men Life Events	.29	6.31	3	47	.001	
Anxiety Men_T2						.31*
Security_Women_T2						-.31*
Number of Men Life Events						.19
Adding Number of Couple Life Events	.29	4.66	4	46	.003	
Anxiety Men_T2						.32*
Security_Women_T2						-.31*
Number of Men Life Events						.15
Number of Couple Life Events						.053
Adding Positive Impact of Dyad's Interpersonal Events	.36	5.13	5	45	.001	
Anxiety_Men_T2						.34**
Security Women_T2						-.27*
Number of Men Life Events						.058
Number of Couple Life Events						.26
Positive Impact of Dyad's Interpersonal Events						-.30*
With only significant variables	.34	10.49	3	62	<.001	
Anxiety Men T2						.33**
Security Women T2						-.41***
Positive Impact of Dyad's Interpersonal Events						-.21 <sup>a</sup>

<sup>a</sup> Marginally significant

\*  $p < .05$

\*\*  $p < .010$

\*\*\*  $p < .001$ .